
अग्नि सुरक्षा से संबद्ध
पारिभाषिक शब्दावली

(दूसरा पुनरीक्षण)

**Glossary of Terms Associated
with Fire Safety**

(Second Revision)

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Fire Safety Sectional Committee had been approved by the Civil Engineering Division Council.

A series of Indian Standards covering fire safety aspects of buildings and different firefighting equipment and appliances have been published and these include a large number of terms relating to fire engineering, fire safety and fire technology. The use of some of the terms and the need to eliminate any ambiguity and misunderstanding in their interpretation had necessitated the preparation of standard on glossary of terms associated with fire safety. This standard was, therefore, brought out in 1978 to fulfil this need. A separate standard IS 7673 : 2004 ‘Glossary of terms for firefighting equipment (first revision)’ has been published giving definitions of terms associated with firefighting equipment.

This standard published as glossary of terms associated with fire safety was first revised in 1999.

This second revision has been brought out to update the definitions based on the experience gained during these years as also to bring it in line with the National Building Code of India 2016 (SP 7 : 2016). In this revision, besides the modification of the existing definitions, number of new terms have also been included. In the formulation of this standard due weightage has been given to international co-ordination among standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

GLOSSARY OF TERMS ASSOCIATED WITH FIRE SAFETY

(Second Revision)

1 SCOPE

This standard covers definition of general and safety terms relating to the phenomenon of fire, fire as related to building materials and structures and method of tests connected therewith and means of escape.

2 TERMINOLOGY

2.1 Abnormal Heat — Additional heat resulting from use up to and including, under normal conditions, that results in a fire.

2.2 Accelerant — Substance used to initiate and develop fire, for example, flammable liquids.

2.3 Acceptance Criteria — Criteria that form the basis for assessing the acceptability of the safety of a design of a built environment.

2.4 Activation Time — Time interval from the response of a sensing device until the fire fighting/suppression systems, smoke extraction and the lime are fully operational.

2.5 Active Smoke Barrier — Smoke barrier that moves from its retracted position into its fire-operational position automatically when called upon to do so.

2.6 Agent Outlet — Outlet in a piping system by means of which an extinguishing agent can be applied towards the source of fire.

2.7 Air-conditioning — The process of treating air so as to control simultaneously its temperature, humidity, purity and distribution to meet the requirements of the conditioned space.

2.8 Alarm Time — Time interval between ignition of a fire and activation of the alarm.

2.9 Alternative Escape Route — Sufficiently separated by either direction and space, or by fire resisting construction, to ensure that one is still available should the other be affected by fire.

2.10 Ambient Temperature — The temperature of the surroundings (unregulated outdoor temperature).

2.11 Anoxia — Severe lack of oxygen in the blood or the brain.

2.12 Arson — Crime of setting a fire usually with a malicious intent.

2.13 Asphyxiation — The suspension of respiration and animation, as the result of the inhalation of substances, such as carbon dioxide, methane, nitrogen, etc, when present in atmosphere to an extent sufficient materially to decrease its normal oxygen content.

2.14 Assisted Evacuation — Strategy that exists during which a designated person or persons provide assistance, during an emergency, to another person to leave a building or a specific part of the built environment and to reach a final place of safety.

2.15 Atrium — A large-volume space created by a floor opening or series of floor openings connecting two or more stories that is covered at the top of the series of openings and is used for purposes other than an enclosed stairway; lifts hoist-way; an escalator opening; or as a utility shaft used for plumbing, electrical, air conditioning, or communications facilities.

2.16 Auto-door Release — A device when fitted to self-closing door allows to remain the door open under normal conditions but on the actuation of the alarm, releases the door which returns to the closed position.

2.17 Auto Ignition — Ignition resulting from a rise of temperature without a separate ignition source.

2.18 Auto-Ignition Temperature — Minimum temperature at which a material will ignite by itself in air and sustain combustion without initiation by an external spark or flame under specified test condition.

2.19 Automatic Fire Detection and Alarm System — A system comprising components and sub-systems required for automatically detecting smoke, heat or fire initiating an alarm and other actions as appropriate. This system also includes manually operated electronic fire alarm (MOEFA) system.

NOTE — MOEFA system (with or without automatic fire detection and alarm system) includes all or some of the components such as manual call stations (initiating an alarm for fire and other actions as required), talk-back system and public address system.

2.20 Back Draft — Rapid flaming combustion caused by the sudden introduction of air into a confined

oxygen-deficient space that contains hot products of incomplete combustion.

2.21 Balusters — Plain moulded or turned posts for use of staircases, terraces and balconies (short pillars used as support to handrail of staircases).

2.22 Balustrades — Assemblages of balusters or other ornamental treatment for forming a safeguard at the sides and the heads of stair flights and landing and also to terraces, balconies, etc.

2.23 Barrier Movement — Travel distance (for example, height drop) of an active barrier from its retracted position to its fire operational position.

2.24 Basement — Any storey of a building wholly or partly below grade plane that is not considered the first storey above grade plane.

2.25 Blast Effect — Damage caused by shock waves from an explosion.

2.26 BLEVE (Boiling Liquid Expanding Vapour Explosion) — An explosion caused by rapid expansion of flammable gas stored in a container resulting in sudden release of huge quantities of atomised burning liquid which appear as a fire ball up and radiating intense heat all-around.

2.27 Boil Over — In a flammable liquid storage tank, it is the discharge with exceptional violence of part of the contents of burning tank.

2.28 Boiling Point — Minimum temperature at which the vapour pressure of the liquid is equal to atmospheric pressure.

2.29 Brand — A freely burning fragment of substance which may fall or become airborne either by wind or by convection currents.

2.30 Building — Any structure for whatsoever purpose and of whatsoever materials constructed and every part thereof whether used as human habitation or not and includes foundation, plinth, walls, floors, roofs, chimneys, plumbing and building services, fixed platforms, verandah, balcony, cornice or projection, part of a building or anything affixed thereto or any wall enclosing or intended to enclose any land or space and signs and outdoor display structures. Tents, SHAMIANAHS, tarpaulin shelters, etc, erected for temporary and ceremonial occasions with the permission of the Authority shall not be considered as building.

2.31 Burn — Injury or damage caused by flame/heat to living beings.

2.32 Burn Back — Flames going back over an area previously extinguished, may be due to incomplete cover or fire extinguishing media foam degradation.

2.33 Burning Behaviour — All the physical and/or chemical changes that take place when a material, product and/or structure burns or is exposed to fire.

2.34 Calorific Potential/Heat of Combustion — Calorific energy which could be released by the complete combustion of a unit mass of a material.

2.35 Cavity Wall — A wall formed from/built into thicknesses, separated by an air space. The two thicknesses being connected by occasional ties of metal or brick. Also known as hollow wall.

2.36 Ceiling (Suspended, Fire-Resisting) — A ceiling assembly capable of contributing, wholly or in part to the overall fire resistance of the floor above and/or its supporting members. This ceiling can be designed as a horizontal fire barrier to prevent the vertical spread of fire.

2.37 Channelling Screen — Smoke barrier installed beneath a balcony or projecting canopy to direct the flow of smoke and hot gases from a room opening to the spill edge.

2.38 Charring — The formation of a light, friable, mainly carbonaceous constituent residual on wood or other organic matter resulting from incomplete combustion and/or devolatilization following exposure to heat.

2.39 Chimney Effect (Flue Effect) — The upward movement of hot fire effluent caused by the convection currents confined within an essentially vertical enclosure.

2.40 Co-efficient of Thermal Expansion — The proportional increase in length, volume of superficial area of a body per degree rise in temperature at a constant pressure.

2.41 Column or Stanchion (Fire-resisting) — A structural member (that transmits, predominantly through compression, the weight acting on top of it to other structural elements below) with or without any additional protection, capable of satisfying one of the criteria of fire resistance namely, resistance to collapse (stability), integrity and insulation during rise in temperature.

2.42 Combustible — An object that is capable of combustion.

2.43 Combustible Material — A material which either burns itself or adds heat to a fire, when tested for non-combustibility.

2.44 Combustion — Exothermic reaction of a combustible substance with an oxidiser, usually accompanied by flames, and/or glowing and/or emission of smoke.

2.45 Common Path of Travel — That portion of the exit access which the occupants are required to traverse before two (or more) separate and distinct routes or two (or more) exits become available. Common paths of egress travel shall be included within the permitted travel distance.

2.46 Compartmentation — The divisions of a building into fire-tight compartments by fire-resisting elements of building construction in order to contain a fire and smoke (products of combustion) within the compartment of origin for a specific period of time.

2.47 Compartment Floor — A fire-resisting floor used in dividing a building vertically into separate compartments.

2.48 Compartment Wall — A fire-resisting wall used in dividing a building horizontally into separate compartments.

2.49 Conductive Floor — Floor which is rendered electrically conductive by integral or applied floor finish for preventing static sparks.

2.50 Conflagration — A fire which involves not only the building in which it originates, but also other buildings and property over a considerable area adjacent to it.

2.51 Consumable Power Supplies — Any form of power that, when not available, prevents an active smoke barrier from moving to the required fire operational position.

2.52 Containment — Restricting the spread of fire to surrounding structures or areas.

2.53 Convection — Process of transfer of heat by movement of fluid or air.

2.54 Cooling — A process of fire extinguishment control by reduction of temperature.

2.55 Corrosion Damage — Physical and/or chemical damage or impaired function caused by chemical action.

2.56 Covered Area — Ground area covered by the building immediately above the plinth level. The area covered by the following in the open spaces is excluded from covered area:

- a) Garden, rockery, well and well structures, plant nursery, water pool, swimming pool (if uncovered), platform round a tree, tank, fountain, bench, *CHABUTARA* with open top and unenclosed on sides by walls and the like;
- b) Drainage culvert, conduit, catch-pit, gully pit, chamber, gutter and the like;

- c) Compound wall, gate, unstoreyed porch and portico, slide, swing, uncovered staircases, ramp areas covered by *CHHAJJA* and the like; and
- d) Watchman's booth, pump house, garbage shaft, electric cabin or substations, and such other utility structures meant for the services of the building under consideration.

2.57 Critical Fire Load — Fire load required in a compartment to produce a fire of sufficient severity to cause failure of a fire barrier(s) or structural member(s) located within or bounding the fire compartment.

2.58 Cryogenic Gases — Substances in a gaseous state which cannot be liquefied by pressure alone and are therefore cooled to a low temperature for storage and temperature in the liquid state.

2.59 Dangerous Contaminant — A substance not normally found in a pure state and the presence of which even in small quantity may be dangerous owing to it acting as a catalyst or by itself entering into a potentially dangerous reaction.

2.60 Dead End — An area from which escape is possible in one direction only.

2.61 Deflagration — Combustion wave (explosion) propagating in subsonic velocity.

2.62 Deflection — Movement of a smoke barrier when subjected to the buoyant force of the hot smoke, the movement of air, air pressure or any combination thereof.

2.63 Detonation — Detonation of explosion and characterized propagating at supersonic velocity by a shock valve.

2.64 Discharge Rate — Number of persons which can pass through one unit of exit width in a given time.

2.65 Discharge Value — The maximum number of persons who can effectively egress through a given number of units of exit width in a given period of time having regard, in multi-storey buildings, to the capacity of the staircase(s).

2.66 Door Assembly, Fire-Check/Fire Door — Any combination of fire door, frame, hardware and other accessories that together provide a specific fire resistant rating to the opening in terms of its stability, integrity and insulation properties (in case of insulated doors), when installed in the openings in fire separation walls. Fire door is a component of fire door assembly.

2.67 Door Assembly, Fire-resisting — A door which, together with its frame, is capable of satisfying the criteria of fire resistance with respect to collapse, flame and smoke penetration and excessive temperature rise. Such a door may be automatic or self-closing.

2.68 Draft — Current of air accelerating towards a fire supplying air for combustion.

2.69 Duct Assembly, Fire-resisting — A duct (including its hardware) which conveys liquid, gas or services through building, and which is capable of satisfying the criteria of fire resistance with respect to collapse, flame penetration and rise of temperature beyond any prescribed value.

2.70 Dust Explosion — Rapid oxidation type of explosion in a suspension of combustible dust in air.

2.71 Dust-tight Enclosure — A type of enclosure for electrical equipment located in dusty atmospheres, which prevent ingress of dust within its interior.

2.72 Egress — A route of travel from any point inside a building to a point outside the building.

2.73 Emergency Lighting — Lighting provided for use when the supply to the normal lighting fails.

2.74 Escape Chute — Open slide like escape used for emergency evacuation.

2.75 Escape Hatch — An emergency means of providing escape from a room or part of a building in the form of a removable or breakable panel in a wall or floor.

2.76 Evacuation Drill — Rehearsal of the evacuation procedure involving participation of the occupants of the premises.

2.77 Evacuation Procedure — A predetermined plan of action designed to achieve the safe evacuation of the occupants of a building to a place of safety.

2.78 Evacuation Time — The time taken for all occupants of a building or part of a building, on receipt of an evacuation signal, to reach a final exit.

2.79 Exit — That unobstructed component of means of egress which is between the exit access and the exit discharge or public way. Exit components include exterior exit doors at the level of exit discharge, interior exit stairways, exit passageways, exterior exit stairways and exterior exit ramps. *See Fig. 1.*

2.80 Exit Access — That portion of a means of egress that leads to an exit (for example, doorways, staircase lobby, verandah, corridor or passageway leading to an exit).

2.81 Exit Discharge — The component of a means of egress between the termination of an exit and a public way.

2.82 Fire Exit — A way out leading to an escape route with or without panic bar hardware provided on the door.

2.83 Horizontal Exit — An arrangement which allows alternative egress from a floor area to another floor at or near the same level in an adjoining building or an adjoining part of the same building with adequate fire separation.

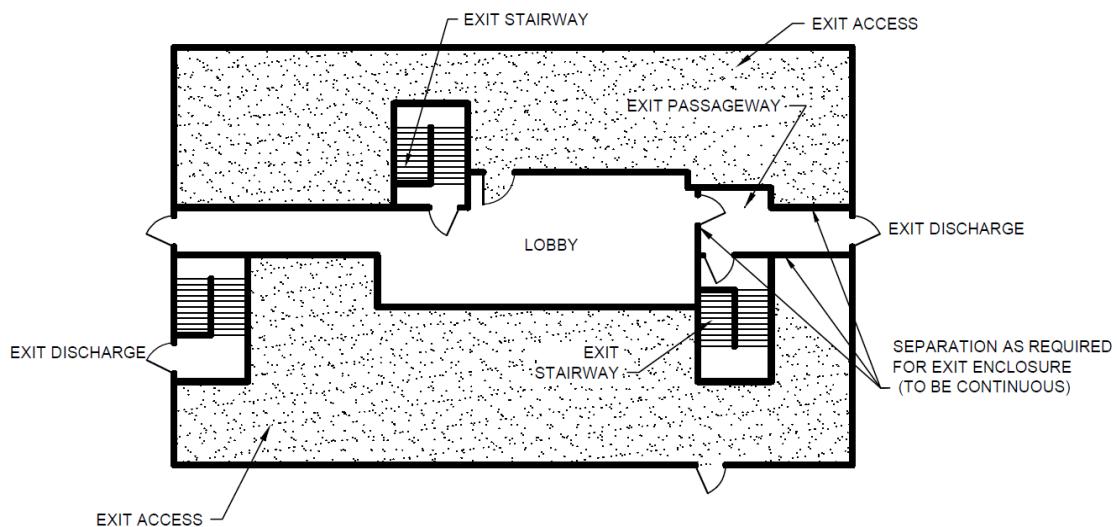


FIG. 1 COMPONENTS OF MEANS OF EGRESS

2.84 Exit Sign — Sign which clearly indicates the exit.

2.85 Exit Width — Unit of the minimum width required for a single file of persons to pass through an exit of 500 mm width.

2.86 Explosion (Decomposition Type) — Instantaneous decomposition of certain endothermic compounds with evolution of hot gases and extremely rapid rise of surrounding air pressure.

2.87 Explosion (Pressure Release Type) — Rupturing of pressure containers due to abnormally high pressure.

2.88 Explosion (Rapid Oxidation Type) — An extremely rapid oxidation reaction with evolution of light, heat and dynamic energy capable of causing structural or other physical damage.

2.89 Explosion Suppression — Appliance containing an explosion suppressant which can be expelled by the action of internal pressure. This pressure may be stored pressure or may be obtained by a chemical reaction such as the activation of an explosive or pyrotechnical device.

2.90 Explosion Vent — An opening in a vessel or building, usually covered by a fragile diaphragm, or a hinged or spring-loaded flap, which in the event of an explosion in the vessel or building allows gaseous products to escape. This venting process is also known as ‘explosion relief’.

2.91 Exposure Hazard — The risk of fire spreading from a building structure, or other property to an adjacent separate building or structure, or to another part of the same building or structure, by radiated heat across the intervening space. Factors determining the exposure hazard include the width of the intervening space, the heights of the buildings and their construction, types of windows, doors, etc.

2.92 Fail-safe — Designed to return to a safe condition in the event of a failure or malfunction, etc.

2.93 Fire

- The process of combustion characterized by the emission of heat accompanied by smoke or flame or both.
- Combustion spreading uncontrolled in time and space.

2.94 Fire Ball — A spherical mass of flame, which may occur if a large quantity of flammable vapour suddenly ignites in the air as it occurs following BLEVE.

2.95 Fire Barrier (or Fire Resisting Barrier) — A vertically or horizontally aligned member such as a wall or a fire curtain or floor. These may be with discontinuities created by openings with a

specified fire resistance rating, where such members are designed and constructed with a specified fire resistance rating to limit the spread of fire that also restricts the movement of smoke.

2.96 Fire Break — An open space separating buildings, stored products or other combustible materials being itself free of combustible material and designed to restrict spread of fire.

2.97 Fire Classification — Standardized system of classifying fires in terms of the nature of fuel. These are:

- Class A — Fire involving solid materials, usually of an organic nature, in which combustion normally takes place with the formation of glowing embers.
- Class B — Fires involving liquids liquefiable solids.
- Class C — Fires involving gases.
- Class D — Fires involving.
- Class E — Fires involving electrical hazards.
- Class F — Fires involving cooking oil and fat.

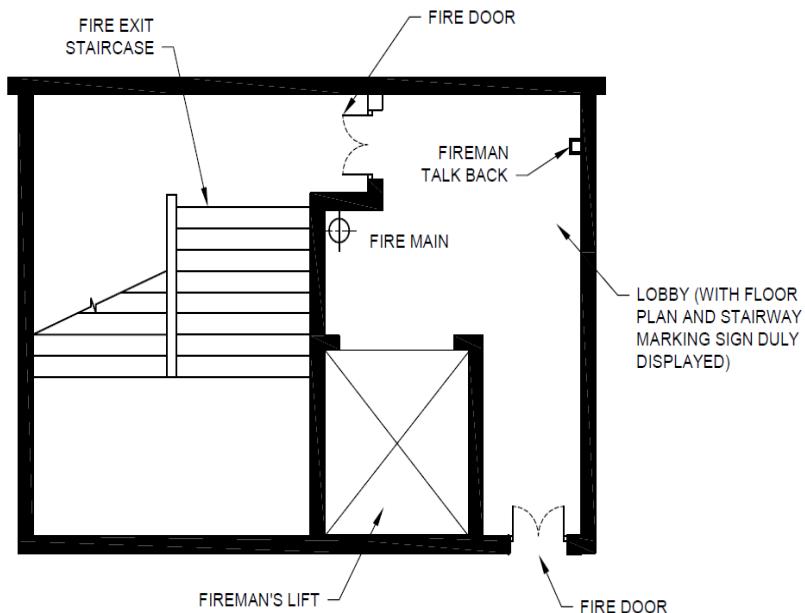
2.98 Fire Compartment — A space within a building enclosed by fire barrier or fire resistant walls on all sides, including the top and bottom.

2.99 Fire Exposure — Extent to which persons, animals or items are subjected to the conditions created by fire.

2.100 Fire Extinguishment — Process that eliminates combustion.

2.101 Fire Fighting Shaft — An enclosed shaft having protected area of 120 min fire resistance rating comprising protected lobby, staircase and fireman’s lift, connected directly to exit discharge or through exit passageway with 120 min fire resistant wall at the level of exit discharge to the exit discharge. These shall also serve the purpose of exit requirement/strategy for the occupants. The respective floors shall be approachable from fire-fighting shaft enabling the fire fighters to access the floor and also enabling the fire fighters to assist in evacuation through fireman’s lift. The firefighting shaft shall be equipped with 120 min fire doors. It shall be equipped with firemen talk back, wet riser and landing valve in its lobby, to fight fire by fire fighters (see Fig. 2 for a typical firefighting shaft.)

2.102 Fire Growth — Stage of fire development during which the heat release rate and the temperature of the fire are increasing.



NOTES

- 1 Where such lobbies and staircase in the firefighting shaft are naturally ventilated/cross-ventilated, the shaft may not be enclosed and fire door need not be provided.
- 2 For all enclosed firefighting shaft, the shaft's lobby should have floor plan duly displayed for the information of firefighters.
- 3 The figure shows a typical firefighting shaft layout. Other such options are also possible.

FIG. 2 TYPICAL FIRE FIGHTING SHAFT

2.103 Fire Hazard Analysis/Fire Hazard Assessment — Evaluation of the possible causes of fire, the possibility and nature of subsequent fire growth, and the possible consequences of fire.

2.104 Fire Hazards — Characteristics of materials, building construction and occupancy which affect the initiation, development and spread of fire.

2.105 Fireman's Lift — A lift or a group of lifts invariably associated with all the features and requirements of a firefighting shaft. Such lift(s) are installed to enable fire services personnel to reach different floors with minimum delay. The lift also serves the purpose of meeting the requirement of evacuation lift for assisted evacuation.

2.106 Fire Load — Calorific energy, of the whole contents contained in a space, including the facings of the walls, partitions, floors and ceilings.

2.107 Fire Load Density — Fire load divided by floor area.

2.108 Fire Operational Position — Final configuration of a device, for example, a smoke barrier, specified by its designer to achieve and be sustained in the ultimate fire condition of the design.

2.109 Fire Point (Flash Point) — The lowest temperature at which a liquid gives off sufficient flammable vapour in air to produce sustained combustion after the removal of the ignition source.

2.110 Fire Prevention — The concept of elimination of all probable causes of fire outbreak.

2.111 Fire Propagation Index — A comparative measure of the contribution to the growth of fire of a combustible.

2.112 Fire Protection — Design features, systems, equipment, buildings or other structures to reduce danger to persons and property by detecting, extinguishing or containing fires.

2.113 Fire Resistance — The property of an element of building construction and is the measure of its ability to satisfy for a stated period, some or all of the following criteria:

- a) Load bearing capacity (Stability) (R) — The ability of a load bearing element to withstand fire exposure without any loss of structural stability.
- b) Integrity (E) — Resistance to penetration of flame and hot gases.
- c) Insulation (I) — Resistance to temperature rise on the unexposed face up to a maximum of

180 °C at any single point and average temperature of 140 °C.

2.114 Fire Resistance Rating — The time that a material or construction will withstand the standard fire exposure as determined by fire test done in accordance with the standard methods of fire tests of materials/structures.

NOTES

1 The fire resistance rating shall be specified in terms of minutes.

2 Fire resistance rating for non-structural material/assembly shall bear a label of compliance to such rating as per the approval of competent authority based on testing and evaluation. The label shall be permanently affixed to the material/assembly and may carry other relevant details such as name and type of the product, and manufacturer's details.

2.115 Fire Resistant Wall — Fire resistance rated wall, having opening(s) with specified fire resistant rating, which restricts the spread of fire from one part of a building to another part of the same building.

2.116 Fire-resisting Beam — A structural member with or without any additional protection, capable of satisfying one or more of the criteria of the resistance namely, resistance to collapse in case of fire.

2.117 Fire-resisting Damper — A movable closure within a duct, which on operation is intended to prevent the passage of fire or smoke or gases and which together with its frame will be capable of satisfying the criteria of fire resistance with respect to collapse and flame penetration.

2.118 Fire Resistive Construction — The type of construction in which the structural members including walls, partitions, columns, floors and roofs are designed to withstand resistance to fire for a specified period.

2.119 Fire Retardant (Flame Retardant) — A substance or treatment applied to combustible material to increase its ignition temperature, decrease its tendency to propagate flame across its surface and increase its resistance to pyrolysis and destruction by heat.

2.120 Fire Risk — Probability of a fire combined with a quantified measure of its consequence.

2.121 Fire Safety Engineering — Application of engineering methods based on scientific principles to the development or assessment of designs in the built environment through the analysis of specific fire scenarios or through the qualification of risk for a group of fire scenarios.

2.122 Fire Safety Management — Application and service life maintenance of procedures to achieve fire safety objectives.

NOTE — Procedures include fire protection measures, evacuation plans and the training of occupants to use such measures and plans.

2.123 Fire Safety Objective — Desired outcome with respect to the probability of an unwanted fire relative to essential aspects of the built environment.

2.124 Fire Separating Wall — A wall or walls that create fire separation between two tenants or dwelling units. Such walls include, tenant separation walls, corridor walls, vertical shafts, room separations. Walls that separate hotel room from the corridor or adjoining room are also fire separation walls. Fire separation walls are used to contain fire to the hotel room or the dwelling unit where fire has originated. Unlike fire walls, these walls can be added or changed during interior design project; and these walls do not necessarily extend from basement to roof and extend beyond roof.

2.125 Fire Separation — The distance in metre, measured from the external wall of the building concerned to the external wall of any other building on the site, or from other site, or from the opposite side of street or other public space for the purpose of preventing the spread of fire.

2.126 Fire Stop — A fire resistant material, or construction, having a fire resistance rating of not less than the fire separating elements, installed in concealed spaces or between structural elements of a building to prevent the spread/propagation of fire and smoke through walls, ceilings and like as per the laid down criteria.

2.127 Fire Vent — An opening in the enclosing walls or roof of a building, intended for releasing heat and smoke in the event of fire and automatically or manually opened or both.

2.128 Fire Wall or Fire Separating Wall — A fire resistance rated wall having fire protected openings, which restricts the spread of fire and extends continuously from the foundation to the roof, and through the roof at least 1 m above the roof in case of combustible roof, with sufficient structural stability under fire conditions to allow collapse of construction on one side or either sides without collapse of the wall.

2.129 Fitness for Purpose — Ability of a product, process or service to serve a defined purpose under specific conditions.

2.130 Flame — Rapid, self-sustaining and subsonic propagation of combustion in a gaseous medium, usually with emission of light.

2.131 Flame Arrestors — A device fitted to prevent the passage of flames.

2.132 Flame-proof Enclosure — An enclosure for electrical machinery or apparatus that will withstand, when covers or other access doors are properly secured, in internal explosion of the flammable gas or vapour which may enter or which may originate inside the

enclosure without suffering damage and without communicating the internal flame (or explosion) to the external flammable gas or vapour.

2.133 Flammable — A combustible material which ignites very easily and either burns very intensely or has a rapid flame spread.

2.134 Flammability — Degree of ease with which a material catches fire and its intensity.

2.135 Flammability Limit — Concentration of fuel vapour in air either above which or below which propagation of a flame does not occur in the presence of an ignition source.

2.136 Flame Retardant — Substance added or a treatment applied to a material in order to suppress or delay the appearance of a flame and/or reduce the flame rate.

2.137 Flash (Fire) — A flame of very short duration.

2.138 Flashover — A stage in the development of a contained fire at which all the combustibles in the enclosures flash into fire simultaneously.

2.139 Flash Point — The minimum temperature at which a liquid gives off sufficient vapour to produce a flammable vapour-air mixture at the lower limit of flammability.

2.140 Floor Fire-resisting — A floor, with or without a ceiling beneath, which, when exposed to fire conditions from below, is capable of satisfying for a stated period of time the criteria of fire resistance with respect to collapse, flame penetration and excessive temperature rise.

2.141 Flue Effect — The upward thrust of convection currents of hot gases through vertical openings.

2.142 Free Area — Total area of all designed openings and clearance gaps in and/or around the perimeter of a smoke barrier.

2.143 Fuel — A substance (which may be gaseous, liquid or solid) that will produce energy as heat (in useful amounts) when ignited.

2.144 Glazing Assembly, Fire-resisting — Glazing including the associated hardware, capable of satisfying for a stated period of time the criteria of fire resistance with respect to collapse and flame penetration.

2.145 Gross Area — Total floor area contained within a building, including the horizontal area of external walls.

2.146 Height and Area Limitation — Maximum limitations in respect of height and floor areas of building to:

- a) prevent excessive area subject to a single tire,
- b) assure opportunity to occupants to evacuate safely, and
- c) assure manageable tire service.

2.147 Hardware

2.147.1 Hardware, Fire Exit — A door-latching assembly incorporating an actuating member or bar that releases the latch bolt upon the application of a force in the direction of egress travel and that additionally provides fire protection where used as part of a fire door assembly.

2.147.2 Panic Hardware — A door-latching assembly incorporating an actuating member or bar that releases the latch bolt upon the application of a force in the direction of egress travel.

2.148 Horizontal Exit — A defend in place or a staging arrangement, providing safety from fire and smoke originating from the area of incidence, by allowing alternative egress from a compartment to an area of refuge or another compartment at or near the same level. This also includes such egress from a compartment to an adjoining building (see 2.83). A horizontal exit shall be through a fire door of 120 min rating in a fire resistant wall. Horizontal exit require separation with the refuge area or adjoining compartment through 120 min fire barrier. The adjoining compartment of the horizontal exit should allow unlocked and ease of egress and exits for the occupants using defend in place strategy.

2.149 Hot Work — Work involving flames or temperatures likely to be sufficiently high to cause ignition of flammable gas.

2.150 Housekeeping — State of maintenance and cleanliness of an occupancy, affecting the frequency and growth of fires.

2.151 Hyperbolic Chambers — Enclosures within which air pressure is much higher than under normal atmospheric conditions.

2.152 Ignitability — Degree of ease with which a material can be ignited.

2.153 Ignition — Initiation of combustion.

2.154 Ignition Source — Source of energy that initiates combustion.

2.155 Ignition Temperature — The lowest temperature of a substance at which sustained combustion can be initiated.

2.156 Incandescence — Emission of light produced by a material when intensely heated.

2.157 Incendiарism — Intentional and culpable generation of fire.

2.158 Inerting — Filling an enclosed space with an inert gas to prevent formation of explosive vapour-air mixture.

2.159 Inhibition — A process of fire extinguishment by the use of an agent which interrupts the chemical reactions in the flame.

2.160 Insulation Criteria — Resistance to temperature rise on the unexposed face up to a maximum of 180 °C at any single point and average temperature of 140 °C.

2.161 Integrity — Ability of a barrier to maintain its soundness for the purpose for which it is intended without the transmission of significant quantities of flames or hot gases to the non-exposed side.

2.162 Integrity Criteria — Criterion by which the ability of a separating element to prevent the passage of flames and hot gases is assessed.

2.163 Intrinsically Safe Circuit — Circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under specified conditions.

2.164 Intrinsically Safe System — Assembly in which all electrical circuits that can be used in hazardous locations are intrinsically safe circuits.

2.165 Landing, Staircase — A level space at the top or bottom of a staircase and/or at each floor level.

2.166 Life Safety Application — Application of the smoke and heat control system in its fire operational condition for the period of time required for the occupants of the premises to be alerted, and to be able to exit the premises, with the smoke and heat control system assisting in the protection of the means of escape.

2.167 Lift Lobby — A space from which people directly enter a lift car(s) and into which people directly enter upon exiting a lift car(s).

2.168 Lightning Arrestor — A device for the protection of apparatus from damage by a lightning discharge or other accidental electrical surge.

2.169 Lightning Conductor — A metal strip connected to earth at its lower end, and its upper end terminated in one or more sharp points where it is attached to the highest part of a building. By electrostatic induction it will tend to neutralize a charged cloud in its neighbourhood and the discharge will pass directly to earth through the conductor.

2.170 Lining Material — Any material used for lining walls, ceiling or floors of building for insulation, decoration or other purposes.

2.171 Linking Balcony — An arrangement which provides access to an adjacent protected area, via a balcony.

2.172 Load Bearing Capacity — Criterion by which the ability of a building element or structure to sustain an imposed load when exposed to fire is assessed.

2.173 Lobby, Fire-Fighting Access — A protected lobby and permanently ventilated having specified dimensions, suitable for use as a means of access for fire-fighting purposes.

2.174 Lobby, Permanently Ventilated — A protected lobby provided with ventilation which is permanently open.

2.175 Lobby, Protected — A lobby forming part or whole of the horizontal component of a protected escape route.

2.176 Lobby Ventilation — A protected lobby provided with means of ventilation to the open air for use when required.

2.177 Low Hazard — These are contents of such low combustibility that no self-propagating fire can occur in these.

2.178 Lower Limit of Flammability — Minimum concentration of fuel vapour in air below which propagation of flame does not occur in the presence of an ignition source.

2.179 Means of Egress — A continuous way of travel from any point in a building or structure to a public way, consisting of three separate and distinct parts, that is, exit access, exit and exit discharge. See Fig. 1.

2.180 Means of Escape — A way out of a building or structure that does not conform to the strict definition of ‘means of egress’ but does provide an alternate way out.

2.181 Mezzanine — A part-floor in between two other floors of a building.

2.182 Mixed Occupancy — A multiple occupancy where the individual building occupancies are intermingled.

2.183 Moderate Hazard — These are contents that are liable to burn with moderate rapidity and to give off considerable volume of smoke but from which neither poisonous fumes nor explosions are to be feared in the event of a fire.

2.184 Movement Time — Time needed for all the occupants of a building to reach a place of safety or safe refuge once they have begun to evacuate. It also refers to the time needed for all the occupants of a specified part of a built environment to move to an exit and pass through it and into a place of safety.

2.185 Multiple Occupancy — A building in which two or more classes of occupancy exist.

2.186 Mushroom Effect — A horizontal spread of hot gases at ceiling or roof level due to the vertical restriction of convection currents.

2.187 Naked Lights — Open flames or fires, exposed incandescent material, or any other unconfined source of ignition.

2.188 Non-combustible — Not capable of undergoing combustion under normal atmospheric pressure and oxygen concentration.

2.189 Non-flammable — Not capable of burning with a flame under specified conditions.

2.190 Occupant Load — Maximum number of persons that might occupy a building or portion thereof at any one time.

2.191 Occupant Load Factor — A factor used in calculating the population density when planning means of escape from a building or part of a building.

2.192 Occupancy, Building — Purpose for which a building, or part of a building is used, or intended to be used.

2.193 Occupancy Group (or Use Group) — The principal occupancy for which a building or a part of a building is used or intended to be used; for the purpose of classification of a building according to the occupancy, an occupancy shall be deemed to include subsidiary occupancies (that is incidental occupancies) which are contingent upon it.

2.194 Occupation Density — Number of persons per square metre of the usable floor area of a room for a given activity. Used to calculate in particular the number and the width of the exits of a room or space.

2.195 Oxidation — Chemical reaction in which the proportion of oxygen or other electronegative element in a substance is increased.

2.196 Oxidizing Agent — Substance capable of causing oxidation.

2.197 Partition, Fire-resisting — A partition either load-bearing or non-load-bearing capable of

satisfying the criteria of fire resistance with respect to collapse, flame penetration and excessive temperature rise.

2.198 Party Wall — Generally called a separating wall now. A wall common to two buildings or two pieces of land.

2.199 Performance Based Design — Design that is engineered to achieve specified objectives and acceptance criteria.

2.200 Petrochemicals — In a genuine sense are those flammable chemicals which are derived (in whole or part) from petroleum or natural gas constituents.

2.201 Place of Safety — Places within a building where people can stay longer until evacuation, for example, refuge areas, terrace and fire/smoke separated compartments.

2.202 Population Density — The number of persons in a given area for whom means of egress shall be provided as determined by the functional use(s) of the building or floor.

2.203 Pressurization — The establishment of a pressure difference across a barrier to protect a stairway, lobby, escape route or room of a building from smoke penetration.

2.204 Pressurization Level — The pressure difference between the pressurized space and the adjoining area served by the pressurized space expressed in Pascal (Pa).

2.205 Products of Combustion — Total gaseous, particulate and aerosol effluents from a fire or pyrolysis.

2.206 Protected Area — Area giving an adequate degree of fire resisting enclosure from other areas and from which there is alternative means of escape.

2.207 Protected Corridor — A corridor forming whole or part of the horizontal component of a protected escape route.

2.208 Purging — Freeing an enclosed space from flammable or toxic vapours/gases by blowing air or inert gas.

2.209 Pyrolysis — Irreversible chemical decomposition of a material due to an increase in temperature without oxidation.

2.210 Pyrophoric Material — Material capable of auto-ignition when brought into contact with air.

2.211 Radiation (Heat) — Transfer of heat through a gas or vacuum other than by heating of the intervening space.

2.212 Ramp — The construction, in the form of an inclined plane that is steeper than or equal to 1:20 (5 percent) from the horizontal, together with any intermediate landing, that makes it possible to pass from one level to another.

2.213 Reactivity, Air — Property possessed by certain chemicals of causing dangerous reactions when exposed to air.

2.214 Reactivity, Water — Property possessed by certain chemicals of causing dangerous reactions when coming into contact with water.

2.215 Refuge Area — An area within the building for a temporary use during egress. It generally serves as a staging area which is protected from the effect of fire and smoke.

2.216 Response Time — Time taken for an active smoke barrier to move to its fire operational position after initiation.

2.217 Roof (External Fire Exposure, Resistance, etc) — The ability of a roof deck and covering to resist both penetration by external fire and flame spread over the external surfaces.

2.218 Roof Screen or Roof Curtain Boards — A vertical screen or substantial non-combustible material fitted internally to the roof of a building to divide the roof into bays so that smoke and hot gases from a fire are contained within the bay of origin if used in conjunction with automatic fire vents, their early actuation is effected.

2.219 Roof Venting — A system of vents which will open automatically in the event of a fire and allow the escape of smoke and hot gases.

2.220 Roof Exits — A means of escape on to the roof of a building, where the roof has access to it from the ground through alternative stair case or adjacent building.

2.221 Room Access — A room which forms the only escape route from an inner room.

2.222 Secondary Fire — A fire which has started some distance from the seat of the original fire but is due to the latter.

2.223 Self-Extinguishing — Incapable of undergoing sustained combustion after removal of the external source of heat.

2.224 Self-heating — An exothermic reaction occurring without the application of external heat.

2.225 Separating Element — Physical barrier intended to resist the passage of fire from one side of the barrier to the other side.

2.226 Shaft, Fire-resisting — A space bounded by fire-resisting elements of building construction and intended for the passage of persons, services or things.

2.227 Shutter Assembly, Fire-resisting — Shutter which, together with its frame; is capable of satisfying the criteria of fire resistance with respect to collapse and flame penetration.

2.228 Sleeping Risk — A form of occupancy or a part of a building in which bedroom or dormitory accommodation predominates, such as in hotels, boarding schools, hospitals and similar establishments.

2.229 Smoke — Visible suspension in atmosphere of solid and/or liquid particles resulting from combustion or pyrolysis.

2.230 Smoke and Heat Control System — Arrangement of components installed in a construction works to limit the effects of smoke and heat from a fire.

2.231 Smoke and Heat Exhaust Ventilation System (SHEVS) — Set of components jointly selected to exhaust smoke and heat in order to establish a buoyant layer of warm smoke above cooler, cleaner air.

2.232 Smoke Barrier — A continuous membrane, or a membrane, where such membrane is designed and constructed to restrict the movement of smoke. It also refers to a device to channel, contain and/or prevent the migration of smoke (fire effluent).

NOTE — Smoke barriers can also be referred to as smoke curtains, smoke blinds or smoke screens.

2.233 Smoke Compartment — A space within a building enclosed by smoke barriers on all sides.

2.334 Smoke Damper — Movable device for smoke control, open or closed in its normal position, which is automatically or manually actuated.

2.235 Smoke Density — The proportion of solid matter present in the smoke, measured on various arbitrary scales.

2.236 Smoke Exhaust — An opening, or a fire-resisting shaft or duct provided in a building to act as an outlet, usually from a basement, for smoke and hot gases produced by an outbreak of fire.

2.237 Smoke Vent — Opening in the enclosing walls or roof of a building, intended to release heat and smoke in the event of fire, automatically and/or manually opened.

2.238 Smoke Reservoir — Region within a construction works limited or bordered by smoke barriers or structural elements so as to retain a thermally buoyant smoke layer in the event of a fire.

2.239 Smothering — A process of fire extinguishment by the limitation or reduction of oxygen.

2.240 Smouldering — Slow combustion of material without visible light and generally evidenced by smoke and an increase in temperature.

2.241 Soot — Finely divided particles, mainly carbon, produced and deposited during the incomplete combustion of organic material.

2.242 Spark, Electric — Instantaneous electrical discharge between bodies at different electrical potentials accompanied by heat and light.

2.243 Spark, Fire — A small incandescent particle.

2.244 Spill Edge — Edge of a soffit beneath which a smoke layer is flowing and adjacent to a void, for example, the edge of a balcony or canopy or the top edge of a window through which the smoke is flowing out of a room.

2.245 Spontaneous Combustion — A biological or chemical reaction in an object or a body which produces its own heat resulting in combustion.

2.246 Spontaneous Heating — A kind of heating internally developed by a body due to bacteriological and/or chemical reaction without drawing off heat from its surroundings.

2.247 Stack Pressure — Pressure difference caused by a temperature difference creating an air movement within a duct, chimney or enclosure.

2.248 Staircase, Enclosed — A staircase physically separated, for example, by walls, partitions, screens, etc from the floors of a building through which it passes, and which does not form part of a protected escape route.

2.249 Staircase, Fire-fighting — A staircase, designated for use by the fire services in obtaining access into a building for fire fighting purposes and provided with fire fighting access lobbies.

2.250 Staircase, Open — A staircase not separated in any way from the floors through which it passes.

2.251 Staircase, Protected — A staircase, protected from the remainder of a building by fire-resisting construction, accessible only through self-closing, fire resisting doors, and forming the vertical component of a protected escape route.

2.252 Stairway Lobby Approach — Protected stairway separated from the accommodation space in a building by protected lobbies.

2.253 Starvation — A process of fire extinguishment by the limitation or reduction of fuel.

2.254 Static Electricity — Electricity, generated as a result of friction between two non-conducting substances.

2.255 Static Smoke Barrier — Smoke barrier permanently fixed in its fire operational position.

2.256 Stop Over — An overflow of the contents of the tanks less violent than boil over when the oil is within 3 m of the top of the tank.

2.257 Structural Fire Protection — Structural features in the layout and/or construction of a building intended to reduce the effects of a fire.

2.258 Substrate — Material that is used or is representative of that used immediately beneath a surface in end use.

2.259 Surface Spread of Flame Classification — The division into classes of combustible building materials according to the rate at which flame spread over their surfaces.

2.260 Temperature-time Curve — Standardized time related variation of temperature prescribed in a specified way during a standard fire resistance test.

2.261 Thermal Conductivity — Time rate of heat flow through unit area, per unit temperature gradient, in the direction perpendicular to the area.

2.262 Thermal Decomposition — Process whereby the action of heat or elevated temperature on an item causes changes to the chemical composition.

2.263 Thermocouple — A junction of wires dissimilar metals used for measuring temperature.

2.264 Thermal Insulation — Fire resistance ability of a separating element when exposed to fire on one side to restrict the transmission of heat.

2.265 Thermal Insulation Material — Material used for the confinement of heat to a particular location.

2.266 Thermostat — An automatic control device responsive to changes of temperature.

2.267 Time-Temperature Curve — A graph that shows the increase in temperature of a fire as a function of time, beginning with ignition and ending with burnout or extinguishment.

2.268 Tinder — Material which can be ignited by an ordinary lighted match, and materials such as wood, cardboard, paper, textiles, etc.

2.269 To Burn — To consume or be consumed by rapid oxidation with the production of heat, usually with incandescence or flame, or both.

2.270 Toxicity — The nature and extent of adverse effects of a substance on a living organism.

2.271 Travel Distance — The distance to be travelled from any point in a building to a protected exit or external escape route or final exit measured along the line of travel.

2.272 Trunking, Fire-resisting — Trunking, not its If part of the structure, which conveys liquid, gas or services through a building and is capable, for a stated period of time of satisfying the criteria of fire resistance with respect to collapse and flame penetration.

2.273 Ultimate Load — The maximum load which a structure is designed to withstand.

2.274 Upper Limit of Flammability — Maximum concentration of fuel vapour in air above which propagation of flame will not occur in the presence of an ignition source.

2.275 Vent, Emergency — Opening fitted with easily rupturable shutter of diaphragm fitted on equipment ducts or buildings to relieve pressure of explosions.

2.276 Venting Fire — The process of facilitating heat and smoke to leave a building as quickly as possible by such paths so that lateral spread of fire and heat is checked, firefighting operations are facilitated and minimum fire damage is caused.

2.277 Vent, Smoke (Roof) — Automatic or manually closing openings on the roof of a building to vent smoke and hot gases of a fire.

2.278 Ventilation — Simultaneous supply of outside air and the removal of inside air from an enclosed space.

2.279 Vertical Opening — Any aperture through vertical opening floors in buildings, such as lifts, ducting, stairs, services. These openings can act as channels for the vertical spread of fire and smoke.

2.280 Vertical Spread — The upward propagation of fire.

2.281 Vestibule — Small lobby or enclosed space between the outer doors and the interior of a building.

2.282 Visual Strobes/Flashing — An audio-visual fire alarm for alerting persons with hearing impairment with flashing light. The strobe frequency should be from 0.5 Hz to 4.0 Hz.

NOTE — Care should be taken to ensure that overlapping strobes do not combine to result in a higher frequency of flashing.

2.283 Void Edge Screen — Smoke barrier deployed beneath the edge of a balcony or projecting canopy.

NOTE — Void edge screens can be used either to create a smoke reservoir beneath the balcony or canopy or to restrict the length of spill edge in order to create a more compact spill plume.

2.284 Void-sealing Screen — Smoke barrier deployed across a void to create a smoke reservoir beneath the smoke barrier.

2.285 Volatility — The tendency of a liquid to vapourize.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Fire Safety Sectional Committee, CED 36

<i>Organization</i>	<i>Representative(s)</i>
In personal capacity (<i>K-33A, Green Park, New Delhi</i>)	SHRI S. K. DHERI (<i>Chairman</i>)
Advance Firetec and Research Lab Pvt Ltd, New Delhi	SHRI S. K. NANDI SHRIMATI INDU SHARMA (<i>Alternate</i>)
Bhabha Atomic Research Centre, Mumbai	SHRI A. K. TANDLE
CSIR-Central Building Research Institute, Roorkee	SHRI SUVIR SINGH SHRI A. A. ANSARI (<i>Alternate</i>)
Central Industrial Security Force, New Delhi	SHRI RAJNATH SINGH SHRI A. K. VERMA (<i>Alternate</i>)
Central Public Works Department, New Delhi	CHIEF ENGINEER (CSQ) (E) SUPERINTENDING ENGINEER (TLQA) (<i>Alternate</i>)
Centre for Fire Explosive & Environment Safety, Delhi	Dr K. C. WADHWA
Chennai Petroleum Corporation Limited, Chennai	SHRI J. P. K. HEPAT
City and Industrial Development Corporation, Navi Mumbai	SHRI ARVIND MANDKE
Delhi Fire Services, New Delhi	DIRECTOR CHIEF FIRE OFFICER (<i>Alternate</i>)
Delhi Metro Rail Corporation Limited, New Delhi	SHRIMATI PAPIYA SARKAR SHRIMATI RASHMI BHARDWAJ (<i>Alternate</i>)
Directorate General of Quality Assurance, Ministry of Defence, New Delhi	CONTROLLER QA (FE) JOINT CONTROLLER QA (FE) (<i>Alternate</i>)
Directorate of Fire and Emergency Services, Panaji	DIRECTOR
Engineers India Limited, New Delhi	SHRI S. K. NASKAR SHRI DINESH DEBBARMA (<i>Alternate</i>) SHRI NISHANT SINGLA (<i>Young Professional</i>)
Fire and Security Association of India, Gurugram	SHRI RAJNISH AGGARWAL SHRI SURESH MENON (<i>Alternate</i>)
Fire Safe India Foundation, Mumbai	SHRI MILINDKUMAR DESHMUKH
FM Engineering International Limited, Bengaluru	SHRI SRIKANTH YAJJALA SHRI MANIKANDAN KRISHNAMOORTHY (<i>Alternate</i>)
Fyrprotek (Fire Engineers & Consultants), New Delhi	SHRI GULSHAN KHURANA
GAIL (India) Limited, New Delhi	SHRI D. P. NANDA SHRI R. P. SINGH (<i>Alternate</i>)
Hilti India Private Limited, Gurugram	SHRI BRIJ BHUSAN SINGH SHRI ARAVIND CHAKRAVARTY V. (<i>Alternate</i>)
Indian Association of Structural Engineers, New Delhi	SHRI S. C. MEHROTRA SHRI SITARAM AGGARWAL (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
Indian Institute of Technology Roorkee, Roorkee	PROF VISHAL KUMAR PROF UMESH KUMAR SHARMA (<i>Alternate</i>)
Indian Oil Corporation Limited, Noida	REPRESENTATIVE
Institution of Fire Engineers (India), New Delhi	PRESIDENT GENERAL SECRETARY (<i>Alternate</i>)
J & K Fire and Emergency Services, Srinagar	SHRI V. K. SINGH SHRI BASHIR AHMED SHAH (<i>Alternate</i>)
Johnson Controls (I) Pvt Ltd, Pune	SHRI SANTOSH MUZUMDAR SHRI ASHISH D. SAWANT (<i>Alternate</i>)
Karnataka Fire Services, Bengaluru	REPRESENTATIVE
Lloyd Insulations (India) Limited, New Delhi	SHRI K. K. MITRA SHRI SANJEEV ANGRA (<i>Alternate</i>)
Maharashtra Fire Services, Mumbai	SHRI S. S. WARICK
Ministry of Home Affairs, New Delhi	SHRI D. K. SHAMI
Military Engineer Services (E-in-C's Branch), New Delhi	SHRI N. K. GOYAL LT COL K. V. VINAYAKA (<i>Alternate</i>)
Mumbai Fire Brigade, Mumbai	CHIEF FIRE OFFICER DEPUTY CHIEF FIRE OFFICER (<i>Alternate</i>)
National Association of Fire Officers (NAFO), Mumbai	REPRESENTATIVE
Nohmi Bosai (India) Pvt Ltd, Gurugram	SHRI AJIT RAGHAVAN
NTPC Ltd, Noida	SHRI SANTOSH KUMAR JHA SHRI DOONDESHWAR V. (<i>Alternate</i>)
Oil Industry Safety Directorate, Noida	SHRI S. C. GUPTA SHRI B. R. GADEKAR (<i>Alternate</i>)
Pacific Fire Controls, Delhi	SHRI RAKESH KUMAR ARORA SHRI DAKSH ARORA (<i>Alternate</i>)
Proion Consultants, New Delhi	SHRI SANDEEP GOEL
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State Bank of India, Mumbai	SHRI VINAYAK GOKHALE FIRE OFFICER (<i>Alternate</i>)
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Techno Fire Protection Services Pvt Ltd, Pune	SHRI D. G. KOIMATTUR
The Automotive Research Association of India, Pune	SHRI CHARUDATTA S. MUKHEDKAR SHRI R. D. CHAUDHARI (<i>Alternate</i>)
The Indian Institute of Architects, Mumbai	AR VIJAY GARG
Telangana State Disaster Response and Fire Service Department, Hyderabad	SHRI C. LAKSHMI PRASAD SHRI V. PAPAIAH (<i>Alternate</i>)
U.P. Fire Services, Lucknow	SHRI AMAN SHARMA
UL India Pvt Limited, Bengaluru	SHRI SURESH SHANMUGAM SHRI RENOY RAJAN (<i>Alternate</i>)
West Bengal Fire Services, Kolkata	SHRI G. K. BHATTACHARYA

<i>Organization</i>	<i>Representative(s)</i>
In personal capacity (<i>D-317, 2nd Floor, Nirman Vihar, New Delhi</i>)	SHRI R. C. SHARMA
In personal capacity (<i>A-45, Sector-70, Noida</i>)	DR H. S. KAPRWAN
In personal capacity (<i>27A, Tapovan Senior Citizens Foundation, Coimbatore 641 010</i>)	SHRI T. R. A. KRISHNAN
BIS Directorate General	SHRI SANJAY PANT, SCIENTIST 'F' AND HEAD (CIVIL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

Member Secretary

SHRI ARUN KUMAR S.
SCIENTIST 'E' (CIVIL ENGINEERING), BIS

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Headquarters:

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Website: www.bis.gov.in

Regional Offices:

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